

REMARKS

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Claim 6 has been objected to because the word “to” in the claim should be “from”. This has been corrected.

Claims 3 and 7 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The objectionable limitations have been removed and respectively appear in new claims 10 and 11.

Claims 1-4, 6 and 9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yasuda (JP5068993A), further in view of Langlais (US 6974544B1) for the specifics of the zeta potential measurement. Claims 5, 7 and 8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yasuda, in view of Langlais for the specifics of the zeta potential measurement, in further view of Krulik et al. (US Publ. 2002/0113023) for pH adjustment and mixtures of coagulating reagents.

Claims Rejections - 35 USC § 103 - Discussion

Claims 1-4, 6 and 9 are rejected as being unpatentable over Yasuda in view of Langlais for the specifics of the zeta potential measurement. The Applicant disagrees.

Yasuda teaches a method for treating sludge of a purifying tank allowing a reduction of the size of the treatment apparatus.

Yasuda discloses a double injection of flocculant (not a coagulation reagent):

- a first injection of flocculant 2 is made in a mixing tank 3 receiving sludge 1, to flocculate and grow particles;

- the mixture is introduced into a mechanical separation tank 4 to be separated into excessive sludge 5 and a separated liquid 6;
- then a second injection of flocculant 7 (not a coagulation reagent) is made into the separated liquid 6 to perform flocculation in a tank 8,
- then, the mixture is introduced into an ultrafiltration membrane separation tank 9.

The mechanical separation step 4 of Yasuda is quite different from the step of clarification by settling or flotation according to the invention.

Moreover, Yasuda teaches flocculation of sludge. Flocculation is obtained by sticking together the sludge particles with an injection of flocculant reagents. Such flocculant reagents operate like a glue and induce production of very thick sludge for miniaturizing the apparatus.

However, according to the invention the treatment comprises two steps with coagulation reagents for cancelling the electric charges of colloidal material, as indicated by measuring zeta potential, which does not concern the flocculation of Yasuda.

In conclusion, Yasuda relates to a problem of sludge different from the water treatment concerned by the invention. Yasuda teaches double injection of flocculants with a mechanical separation step, quite different from double injection of coagulant reagents with an intermediate step of flotation or settling obtained with a clarifier 2.

There is no reasonable ground for a man skilled in the art to consider Yasuda (sludge treatment) in view of Langlais WO 01/41906, concerning water treatment with coagulation reagent.

Langlais discloses use of a coagulation reagent, by a single injection, with a small dose (the added dose is in the range $X/30 - X/80$, X being the dose making the zeta potential zero), before membrane filtration.

Contrary to Langlais, the invention claims a double injection of coagulation reagent,

- **a first injection** of a coagulation reagent dose being in the range of 75.0% - 125% of the dose making the zeta potential zero, said injection being operated in a zone located upstream of a clarification step;
- a clarification step;
- in a zone located downstream of the clarification step, and upstream of the membrane filtration step, **a second injection** of a coagulation reagent dose in the range of 0.1 % - 25 % of the dose making the zeta potential zero.

Claim 1 differs from Langlais by

- an injection of coagulation reagent according to 75.0 to 125 % of the optimal coagulation dose, upstream of a clarification step;
- then a step of clarification by settling or flotation.

It is only downstream of the clarification step that 0.1 to 25.0 % of the optimal dose is injected in a zone located upstream of the membrane filtration step.

According to the invention, it is possible to treat effluents, particularly wastewater, containing various particulate colloidal substances and to control clogging of the membranes. The surprising results realized by the invention are given in the present specification, especially page 4, lines 37-39 and page 5 lines 1-11.

It is not a reasonable assertion that a man skilled in the art would consider Yasuda in view of Langlais which handles a problem different from the one of Yasuda. Coagulation agents are quite different from flocculants.

But, even if Langlais were considered by a man skilled in the art, there would be only a single coagulation reagent injection, as normally taught by Langlais.

Assuming nevertheless that the man skilled in the art, contrary to the general knowledge, would replace flocculant of Yasuda by coagulation reagents of Langlais, for the two injection steps, the invention would still not be obvious because:

- the doses of each injection would not be those of the invention;
- the separation step, between the injections, would be mechanical instead of a clarification by settling or flotation according to the invention.

In summary independent Claim 1 is not made obvious by Yasuda in view of Langlais and the more detailed dependent claims add further limitations that avoid the prior art.

Krulik et al, cited for pH adjustment and mixtures of coagulating reagents does not overcome the deficiencies of Yasuda in view of Langlais.

Krulik et al. relates to a method of removing arsenic and fluoride from aqueous solutions. Such a pollution is a soluble one, contrary to the colloidal pollution treated by the invention.

Krulik et al. changes the soluble pollution into particle pollution which is removed by filtration through a membrane. In particular, Krulik includes the steps:

- precipitation of arsenic and fluoride (see [0026] and [0027] to form insoluble particles); and
- then adsorption (see [0030] and [0031]) of said insoluble particles by additional coagulant and/or flocculant [0029].

The objective is to transfer the small insoluble particles on larger particles which will not enter into the pores of the membrane.

The two steps, precipitation and adsorption of Krulik et al. are executed without any intermediate step of settling and/or flotation. Krulik et al. provides a third step (see [0033]) consisting of an addition of coagulant and/or flocculants to get larger sizes of particles.

Krulik et al. does not disclose or suggest a cancellation of the Zeta potential (pZ).

In summary:

Krulik et al. does not disclose or suggest any intermediate separation step by settling or flotation between the injections of reagents and upstream of the filtration by a membrane;

Krulik et al. relates to objectives and phenomena different from the ones of the invention.

The teachings of Krulik et al. would not lead a man skilled in the art to combine Yasuda in view of Langlais in such a way as to reasonably result in the invention defined by the claims.

In view of the above, consideration and allowance are, therefore, respectfully solicited.

In the event the Examiner believes an interview might serve to advance the prosecution of this application in any way, the undersigned attorney is available at the telephone number noted below.

The Director is hereby authorized to charge any fees, or credit any overpayment, associated with this communication, including any extension fees, to CBLH Deposit Account No. 22-0185, under Order No. 21029-00311-US1 from which the undersigned is authorized to draw.

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